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State-Funded "Eminent Scholars" Programs: University Faculty Recruitment as an Emerging Policy Instrument

Over the past two decades, state governments have increasingly invested in programs to recruit accomplished scientists from elsewhere to university positions. This event history analysis suggests that an intriguing mix of comparative state disadvantage and leverageable existing research resources is associated with the likelihood of states adopting such programs.

State governments have directed spending toward science and technology research in universities for decades, but since the 1980s, the focus of these investments has increasingly been on economic development. Instead of the traditional pursuit of heavy industry from other states and nations, these efforts envision stimulating development through homegrown innovation and entrepreneurship in the sciences and technology. Under these "new economy" initiatives, states have instituted tax credits for corporate research and development (R&D) activity, funded the establishment of discovery-oriented tax-exempt organizations, provided venture-capital funds, supported business incubators, created university-

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industry partnerships, invested in new research parks, and provided resources for pursuing eminent researchers in various academic fields (Sá, Geiger, & Hallacheral, 2008; State Science and Technology Institute [SSTI], 2006). Of all of these reforms, state programs to fund the pursuit of star scientists appear to have the greatest potential to influence higher-education institutions. Indeed, such programs are arguably as focused on higher-education development as on economic development (Bozeman, 2000).

States' eminent scholars (ES) programs fund endowed chairs for professorships on research-university campuses. The number of states adopting such programs reached 10 in the late 1990s and doubled to 20 in the following decade. At that rate of growth, it seems likely that half of all states will have such programs within a few years.[1] Analysts at the State Science and Technology Institute (2006) have suggested that success in ES programs depends on recruiting scholars who are favorable toward commercialization of their discoveries and providing an ample initial investment beyond the faculty salary for associated labs, equipment, and staffing. Thus, it is not surprising that these programs can demand significant fiscal commitments from states. Ideally, however, state funds will be supplemented by private support, and the full initial investment earnings will indefinitely cover the faculty member's salary, research assistants, and laboratory costs—ideally precluding a need for further financial support. And, assuming a successful hire, the returns in external support from external research grants may exceed the outlays. With this in mind, these programs have been characterized as the state economic-development investment that "keeps on giving" by stimulating both university development and regional knowledge economies (SSTI, 2006, p. 19).[2]

A prominent early example of a state eminent scholars program emerged in Georgia in the early 1990s. Its founding logic was clear-cut:

> In 1990, a group of Georgia leaders established the Georgia Research Alliance as a not-for-profit 501(c)(3) organization to allow business, research universities and state government to collaborate to build a technology-driven economy fueled by innovative university research . . . . The plan was to attract the world's pre-eminent scientists to lead extraordinary programs of research and development at affiliated Georgia research universities. The focus would be in areas with the most potential for generating new companies, for helping established companies grow, and for creating new science and technology jobs. The cadre of GRA eminent scholars would compete successfully for a larger share of federal and foundation research funds, attract other talented faculty and graduate students to Georgia, and foster new com-

panies and create relationships with industry to commercialize technologies developed through research. (Georgia Research Alliance, n.d.)

By 2011, the state of Georgia had invested more than $550 million in the Georgia Research Alliance (GRA) since its inception, with a large proportion of those funds going into endowed university chairs and supporting equipment and lab infrastructure (Saporta & Karkaria, 2011).[3] By 2012, the state's spending on faculty, fueled by matching private support, had led to the successful recruitment of over 60 eminent scholars to six public and private universities (Georgia Research Alliance, n.d.).[4] These efforts won recognition from the national association of state science and technology programs for "Excellence in Technology-Based Economic Development."[5] Reflecting on this effort, Combes and Todd (1996) concluded that "Georgia has chosen to utilize its public and private research universities as a *de facto* science and technology agency for the purpose of implementing science-based development throughout the state" (p. 75; see also Lambright, 2000).

Operationally, Georgia's program is rather typical of state eminent scholars programs nationwide (Combes & Todd, 1996). In January, the parent GRA sends out a request for proposals to Georgia universities and colleges, highlighting the kinds of investments GRA will emphasize in the coming year. Institutions then tailor faculty hiring requests to the year's priorities. Once proposals arrive, GRA invites private-sector reviewers to help evaluate them. Collaboratively, GRA staff then work with the six member universities to achieve a consensus for a set of investment recommendations to the GRA board. After its own deliberations, the board formalizes GRA's budget request to the governor, who in turn reviews the request, revises it as he/she sees fit, and submits a full state budget request to the state legislature. Once a budget is approved for GRA overall and for the ES program in particular, cooperative funding arrangements are finalized with private-sector actors and universities and faculty recruitment is initiated. In the end, the newly recruited star scientists are encouraged to "conduct research which is codified through academic outputs such as publications . . . [and] also tasked with technology transfer duties that use entrepreneurial tacit knowledge" (Youtie & Shapira, 2008, p. 1196).

All states pursue economic and educational development, of course, but not all states have adopted eminent scholar programs. Only some states choose to elevate higher-education institutions, and in particular the research resources of those institutions, as a vehicle for pursuing state development goals. Because ES programs are politically, financially, and organizationally significant, it is important to investigate the origins of such programs. Which contextual factors influence some states to move toward adopting eminent scholars programs? In particular, how do state socioeconomic, political, and postsecondary policy conditions shape the timing of state experimentation with these programs? The lack of evidence on these questions motivates the present analysis.

The Emergence and Manifest Rationales of Eminent Scholars Programs

Prior to the 1980s, state efforts to boost economic development focused almost entirely on winning competitions for industrial plants and developing in-state human capital. States began to reconsider these traditional approaches to economic development, however, after heated inter-state battles over a variety of major projects in the 1980s, including the federally funded supercollider project:

> In assessing their failures with these recruitment trophies, a number of states realized they had not been engaging their universities in economic development; even fewer had thought of talent not as a mere commodity but as a discriminating vehicle for the future growth of state and regional economies. Texas and Austin had pledged a number of endowed chairs and had made the University of Texas at Austin a significant component of their successful bid for MCC [the Microelectronic Computer Consortium]. Unlike the many previous chases for auto, steel, brewery, and other durable manufacturing branch facilities, this competition began a change in direction for state economic development to one involving talent, technology, and capital, not one just focused on traditional real estate issues of financing bricks and mortar. (Plosila, 2004, p. 115–116)

Since the 1980s, this new approach has especially favored state investment in programs aiming to leverage research universities' capacities for research and development. Irwin Feller (2004) has captured the dominant argument:

> State government support of university science and engineering programs helps universities acquire the infrastructure necessary to enter new technological areas, to catalyze new forms of partnerships between universities and the state's private sector, and to spawn new firms. In the long run, . . . the more robust state economy that flows from this knowledge-based stimulus to technological innovation generates higher revenue levels out of existing tax structures. This increased revenue makes possible increased expenditures for

> all state purposes, including higher education. At the same time, the contributions of university research and technology transfer activities to state economic development objectives serve to build a stronger private-sector political constituency speaking on behalf of university appropriations. Increases in general funds appropriations to universities in turn enable them to maintain, improve, and expand the institutional infrastructures necessary to conduct research in newly emerging areas, as well as to successfully compete nationally for the faculty and students who conduct this research. (p. 140)

Thus, as policy makers have come to view research activity as a central tool for economic development, government investment in university-based research and development programs has acquired an appealing logic increasingly prominent in states' policy debates surrounding science and technology policies. More than ever before, universities' production of new knowledge has come to be an acknowledged element in the political economy of regions, states, and nations (Geiger, 2004; Metcalfe, 2008).

There are counterarguments to this predominant policy perspective, however. Years ago, Feller (1988, 1992a, 1992b) noted that the prevailing logic for government action in this arena creates disappointment in eventual accomplishments, exacerbates stratification among U.S. research institutions (by requiring up-front investments that are difficult for less wealthy states), and dissipates gains from investments in research-based knowledge. More recently, examining state university funding, Feller (2004) has suggested that the touting of universities as engines of economic growth, and parallel investment in aspects of universities strategically targeted for economic-development purposes, oversimplifies and can ultimately disserve larger goals. The role of public postsecondary institutions in science and technology, he argues, is as much in educating and training as in generating research-based knowledge. In a direct challenge to the views of advocates in the technology-policy community, Feller (2004) has further asserted that within the research domain alone, universities' generation of *public* knowledge is more central than the generation of licenses, patents, and other private, profit-related outputs. He argues that the notion of "strategic" investments in specific knowledge arenas (e.g., vaccine development) is flawed in its reliance on external, commercially driven choices and in its encouragement of political trade-offs disserving the larger purposes of higher education (see also Florida & Cohen, 1999). To the extent that investment in certain popular areas of science and technology reduces investment in education, training, and the other goals served by universities, a putatively strategic policy choice may actually reduce the responsiveness and effectiveness of a state's higher-education and economic-development efforts.

These criticisms of state investments in science policy are sweeping. To what extent, however, might they be less applicable to states' ES programs, in particular? Clearly, such programs can support teaching in addition to heightened research productivity, and thus they would seem less vulnerable to the charge of diverting state support away from the core roles of public postsecondary institutions.[6] While the new faculty positions funded by these programs often offer the incumbents reduced course loads, they typically place the new faculty in degree-offering academic programs with the responsibilities of all university faculty members to teach and advise not only one's own graduate research assistants but others as well. In addition, such programs are less targeted than some other ostensibly strategic governmental efforts that have been criticized as ineffective: ES programs do not typically dictate prospectively narrow parameters for scientists' research programs, and they thus provide space for the serendipity and unexpected opportunities that characterize research breakthroughs.

Finally, it can be argued that because ES programs focus on university-based "star scientists," they are cost-effectively targeted on the most consistent predictor of relevant economic development. Zucker and Darby (1996) found that highly accomplished researchers contributed importantly to a region or nation's economic infrastructure for commercialization in science and technology markets. In a later analysis, Zucker and Darby (2006) found that the locations of highly cited scholars in certain fields were closely associated with a region or nation's creation of new firms and production of patents in those fields. Concluding, the authors suggested that "these extraordinary people play a key role in the formation and transformation of high-tech firms" (p. 20).[7]

There is evidence that state science-policy initiatives can ultimately stimulate innovation and broader economic development—numerous examples exist for the biotech industry alone (Feller, 2004). But a wide variety of program options exist for states in this arena, and views differ on their respective merits.[8] Given these differences, states have chosen different policy paths, with only some embracing eminent scholars programs—the policy option that may most fundamentally influence core university operations. Unfortunately, the literature on star faculty-recruitment policies is largely based on case studies of specific initiatives in individual states, inhibiting comparisons among states and broader generalizations. Under what conditions will states adopt programs that provide funding to bring highly accomplished scholars to their most research-intensive institutions? That is, which factors produce the conditions likely to lead to adoption? Although no econometric studies have focused specifically on the emergence of eminent scholars programs, there is sufficient prior related work to help structure such analysis. In the section below, we address what is known and what might be expected in modeling policy adoption in this arena.

Conceptual Framework

Drawing on the state economic-development literature, on theory and research in the field of comparative state policy and politics, and on interviews that our research team conducted with state science-policy experts nationally, we identified a series of factors that we believe are most likely to be associated with state adoption of eminent scholars programs. Fundamentally, the selection of particular factors here reflects a belief that any effort to understand the policy choices of state governments should account both for the socioeconomic, politico-structural, and governance contexts of a given state (i.e., intrastate influences) and the potential diffusing influence that neighboring states may exert over one another's policy behavior (i.e., interstate influences).[9] In the remainder of this section, we describe our reasoning for including specific factors in our analysis of state action regarding ES programs.

Our conceptual framing builds upon a long line of theory and research on the conditions within and among states that appear to influence state adoption of new policies. In fact, over the past 25 years, interest in the conditions shaping state action in many different areas of public policy has surged, in part, because of the introduction of newer analytical techniques (such as event history analysis), which have enabled researchers to draw much stronger causal inferences than before about the determinants of state governmental behavior.

A vibrant literature today exists on factors influencing state adoption of a broad range of state policies, including taxation policy, lotteries, abortion regulations, capital punishment legislation, health insurance reforms, hate-crime laws, same-sex marriage bans, utility regulation, welfare benefits, anti-smoking mandates, administrative reforms in state government, K–12 school reforms, and other areas (Berry & Berry, 1990, 1992; Haider-Markel & Meier, 1996; Ka & Teske, 2002; Mintrom, 1997; Mooney & Lee, 1995, 1999; Schram, Nitz, & Kreuger, 1998; Shipan & Volden, 2006; Soule & Earl, 2001; Volden, 2006). Although an earlier vein of multivariate-statistical research has highlighted the importance of certain state-level conditions in the formation of state policies for higher education (e.g., Hearn & Griswold, 1994; Zumeta, 1996), the past decade has witnessed an outpouring of empirical scholarship on state policy adoption, reform, and change. This scholarship now includes studies on the origins and the spread of many recent reforms in state financing, accountability, and governance of postsecondary education (e.g., Doyle, 2006; Hearn, McLendon, & Mokher, 2008; McLendon, Deaton, & Hearn 2007; McLendon, Hearn, & Deaton 2006; McLendon, Heller, & Young 2005; Mokher & McLendon, 2008).

Virtually all of the American states have recently undertaken noteworthy higher-education policy changes, and the emerging work has provided some valuable, new perspectives on the factors driving those developments. For example, elements of state political systems had long been ignored, or dismissed, as possible influences on the states' adoption of new policies for higher education, but recent scholarship suggests "political" factors have indeed been prime determinants of many of the changes in state policy. That said, researchers are unable yet to point to a specific set of policy drivers that can be said to apply universally across the different, substantive policy areas of higher education.

The absence of any uniform empirical support for specific hypotheses on state policy change in the arena of higher education, in combination with the scarcity of extant empirical research on the rise of eminent scholars programs, per se, precludes our hypothesizing about every potential relationship with precise directionality. Indeed, for many of the factors we discuss below, we can envision competing rationales for their importance. Our approach is therefore one of describing conceptually why each of the factors warrants empirical scrutiny then, in several cases, posing literature-based arguments for the potential causal direction.

We begin by considering the likely policy influence of several indicators of state socioeconomic conditions. Much of the classical literature on policy innovation finds, for example, that wealthier states and states with strong current economic climates are more likely than others to adopt new programs, particularly programs requiring a substantial public investment (Berry & Berry, 1990; Dawson & Robinson, 1963; Mooney & Lee, 1995; Plotnick & Winters, 1985). One might therefore conclude that states with more fiscal capacity would be more likely to adopt ES programs, given the notable up-front, financial costs associated with needed investment in personnel, labs, and equipment.[10]

On the other hand, a state's relative economic privation may serve as a catalyst for its decision to allocate precious public resources to an ES program. According to this counter-narrative, states with weaker economic climates and poorer employment conditions would be more likely to adopt the programs in an effort to build their research base and, thus, strengthen or reposition their economies via targeted investment in R&D infrastructure. Indeed, economic disadvantage has, in some instances, been found to spur the adoption of certain state economic-development initiatives (Berry & Berry, 2007), and we posit that this condition may well have been at work in the emergence of ES policies.

A related factor potentially influencing the creation of state ES programs is the level of a state's workforce that is concentrated in private-sector R&D. Rather than employment levels overall, this factor instead points to patterns within particular segments of a state's labor market as a condition that may influence passage of the programs. As before, we envision two possible competing explanations for the role this condition may play. On one hand, because ES programs will not, in and of themselves, necessarily result in direct economic benefits, it is conceivable that a certain threshold of employment activity within the R&D sector may be needed before states perceive the value of investing in an ES program. Yet, because the programs are designed to boost the flow of R&D dollars that come into a state by recruiting faculty who have strong track records in competing successfully for R&D awards, some observers have concluded that the programs are ideally suited for states that have a "less developed R&D base" (SSTI, 2006, p. 19).

This reasoning, with respect to private-sector R&D employment, could be extended to other indicators of state economic development. For example, one might expect states with a higher total volume of existing R&D infrastructure and activity (e.g., number of patents produced or total federal and state R&D expenditures) to be more likely to adopt ES programs because design of these programs encourages states to build synergistically on existing R&D activities. Conversely, however, states with low overall levels of existing R&D activity may have a heightened incentive to invest in ES programs as one element in a comprehensive effort to leverage state policy in boosting economic development. In the absence of any clear directional evidence, we view both lines of reasoning as quite credible.

Beyond economic context, we hypothesize that certain state politico-structural conditions influence state adoption of ES programs. We focus here on three conditions in particular: party control of state government, legislative professionalism, and the institutional strength of governors. Although these relationships are complex, there is empirical evidence of the effects of party control of governmental institutions on policy outcomes in the states, in general (Alt & Lowry, 2000; Barrilleaux & Bernick, 2003; Barrilleaux, Holbrook, & Langer, 2002; Berry & Berry, 1990; Holbrook & Percy, 1992; Stream, 1999). Democratic Party strength in state legislatures, for instance, has been linked with higher levels of overall state spending, with higher levels of spending on education and welfare programs, and with passage of certain civil liberties and equal-protection laws, while Republicans have been associated with opposition to lotteries and abortion access and with regulatory and tax policies that often are viewed as favorable to business interests. There is even some evidence, growing in recent years, of partisan effects on state policy choices in the arena of higher education, where Republican control of government has been associated with passage of certain accountability and governance reforms and with declining state subsidies for higher education (e.g., Archibald & Feldman, 2006; Lowry, 2007; McLendon, Hearn, & Mokher, 2009).

Almost all of the extant findings, however, come from studies of policies defined as regulatory or redistributive (Lowi, 1964), where the contrasts between the two major political parties are often sharpest. On matters of economic development, the conventional fault lines separating the two major parties become somewhat blurred. Many economic-development initiatives, including ES programs, involve government intervention in the economy (stereotypically favored by Democrats), albeit of a kind that often relies on incentives, competition, and other market forces (themes that Democrats traditionally have less often embraced relative to their Republican counterparts). Douglass (2007) has written on the muddled partisan landscape that characterizes political support of economic development policies in recent years. He notes that, over the past few decades, it has been Republicans more than Democrats who have supported increases in federal funding for basic research conducted largely in U.S. universities, although a bipartisan consensus—both in the federal government and in most states—seems recently to have emerged with respect to the economic wisdom of state-sponsored science and technology initiatives. In effect, we see truly equally compelling reasons politically for the potentially leading role of Democratic- and Republican-controlled governments in the passage of ES programs.

One might plausibly ask whether there are other institutional facets of state governments that shape the states' policy behaviors. Legislative professionalism may be one such factor. Professionalism in this context refers to the degree to which the legislature mirrors the U.S. Congress in three areas: member pay, session length, and staff capacity (e.g., see Squire, 1993). States that pay their legislators more, meet in extended session, and employ a larger share of staff relative to the number of elected members are termed "professionalized." Those states with low member pay, sessions of brief duration, and relatively few staff are called "citizen assemblies."[11] Social scientists have studied legislative professionalism since the late 1950s (Grumm, 1971). Professionalism has been conceptualized to influence a wide range of outcomes both inside and outside legislative institutions, from the adoption of internal rules to specific policy outputs (Squire, 1993; Squire & Hamm, 2005). Here we do see a clear rationale for directionality in our hypothesizing with respect to the introduction of ES programs: Because professionalism endows legislatures with greater capacity for policy research and deliberation, we suspect that higher levels of professionalism may influence states to adopt ES programs.

A final politico-structural consideration involves the role of other institutional actors, particularly the governor. Hart's (2008) case study of the factors promoting "entrepreneurial" versus "locational" economic-development strategies in 16 states found that *governors* appear to have been crucial to the enactment of these programs. Hart finds entrepreneurialism among governors and their staffs, rather than partisanship, as the critical factor in state adoption of certain economic-development strategies. Hart observes that "governors and senior executive branch officials seem to act as policy entrepreneurs in shaping (or failing to pursue) entrepreneurial [economic development] strategies" (2008, pp. 163–164), while party affiliation seems to matter little in determining these outcomes.[12]

Policy entrepreneurs, however, do not operate in a vacuum. One condition that may influence governors' effectiveness as policy champions is the degree of formal power they possess within the broader ecology of their state's governmental system. It is typically believed that governors' influence over policy depends, to some degree, on the extent of their institutional powers (Beyle, 2004; Klarner et al., 2013). These institutional powers vary widely. In some states, governors exert strong power in the form of the line-item veto and appointment powers, for instance. In other states, governors hold fewer or weaker instruments of policy control, which limits their influence over policy development. Again, although scant research exists in the arena of state economic-development policy, we believe that the formal powers of governors probably would have shaped patterns in state adoption of ES programs. Specifically, governors who possess stronger formal powers may be more effective advocates (or "policy entrepreneurs") for these innovative programs.

Moving beyond the political sphere, one important organizational-structural consideration in understanding the emergence of ES programs is the distinctive context for *postsecondary governance* in a given state. All 50 states maintain one of several distinct types of structures for overseeing or governing their postsecondary education systems. The key distinctions among the various statewide approaches to governance are the authorities that boards may possess for directing the academic and fiscal affairs of public colleges and universities and the number and extent of professionalization of staff that are involved in these regulatory activities. Typologies typically portray statewide governing boards as occupying a continuum of control, ranging from highly centralized, regulatory bodies to less centralized, planning bodies. A growing volume of empirical work has found distinct associations between these governance structures and certain state policy outcomes, including the innovativeness of states in the postsecondary education arena (e.g., Hearn & Griswold, 1994; Hearn, McLendon, & Mokher, 2008; Lowry, 2007; McLendon, 2003; McLendon, Hearn, & Deaton, 2006; Zumeta, 1996).

While much of this empirical work has concluded that states whose central boards hold more analytic capacity tend to be ones more likely to adopt innovative policies for higher education, we think the relationship may have been less straightforward in the context of state enactment of ES programs. In fact, two different arguments seem plausible with respect to the impact of board structure. On the one hand, states with more centralized board arrangements (those with more staff and with more professionalized staff) may be more likely to adopt an ES program because of the capacity that resides within them for creative policy development and analysis. What is more, research by Zumeta (1996) has shown that these centralized governing boards can behave like oligarchies, advancing (or shielding) the interests of the research universities that typically dominate these systems. Because ES programs build capacity and generate potential revenues for the very research universities that often wield influence disproportionately in highly centralized state systems, more centralized governance may well be associated with a higher probability of state passage of these innovative programs.

Such would be the dominant expectation from the existing literature base. Yet, it may be that coordinating boards provide a less formalized and "softer" base for the adoption of programs that, by their very logic, center on the interests of only some institutions in a state. Such boards may also possess closer relations with private institutions in states, a helpful resource for proponents of blended programs that provide resources to institutions in both the private and public sectors. Finally, such boards may be associated with adoption because of their capabilities of dealing less frontally, or confrontationally, with the interests of major political players in a state, including governors and legislators. That is, given their arrangement, coordinating boards must balance the interests of universities and state governments, a space in which economic development policies may appeal to both parties. Absent an annual budgetary battle over core funding for institutions, it may be that these boards can better mediate and compromise in the directions of differing policy interests.

A final factor that may shape patterns in state policy adoption of ES programs is the state's *diffusion* context. Diffusion, or the spread of policies across states, has been the subject of widespread empirical interest by social scientists since the path-breaking work of Jack Walker over 40 years ago (1968). Much of the contemporary scholarship conceptualizes policy diffusion as a byproduct of the emulation and competition that exists within the fixed community of autonomous, yet interdependent, state actors comprising America's federal system (McLendon, 2003, Polsby, 1984). There is empirical evidence that, in some policy areas, states do exert an influence over the policy behavior of their neighbors net of the influence exercised by within-state economic, organizational, and political conditions (Berry & Berry, 1990, 1992, 2007; Mintrom & Vergari, 1998; Mooney, 2001; Soule & Earl, 2001). Those working in the area of education policy have likewise found notable diffusion effects accompanying the rise of certain policy reforms in the K–12 and the higher-education sectors (Doyle, 2006; McLendon, Deaton, & Hearn, 2007; Mintrom, 1997; Wong & Langevin, 2006).

On the strength of this research, we reason that the choices states make with respect to adoption of ES programs will likely influence the future choices of their neighbors. Much of the scholarship on diffusion has tended to find positive or null effects, indicating that one state's policy experimentation may have influenced its neighbors or its peers to follow suit. A few recent studies have produced negative relationships, although the authors of those studies have acknowledged they cannot fully explain conceptually or empirically what such a relationship means (Doyle, 2006). Taking our own cue from this literature, we deduce that the signaling between and among states in a given region can be either positive (as, for example, in the case of a perceived policy success) or negative (as in the case of a perceived policy failure or a desire to be first regionally in a particular policy arena). In the case of ES policies, it is most likely to have been positive because of the generally positive policy discourse that has surrounded the initiatives.

Research Design

Event history analysis (EHA) was used to examine the factors that influenced the timing of a state's adoption of an ES policy over the years 1983 to 2007. That focal time period spans from the early emergence of a state ES program in Ohio to the year of the most recent comprehensive data available on relevant contextual factors.

Political scientists have increasingly utilized event history models to understand the occurrence of dynamic social phenomena (e.g., Berry & Berry, 1990; McLendon, 2003; Mooney & Lee, 1995). Very recently, EHA has been incorporated into the study of state adoption of certain education policies, including performance-accountability initiatives in higher education (McLendon, Hearn, & Deaton, 2006), merit-based student grant programs (Doyle, 2006), prepaid tuition and college savings plans (Doyle, McLendon, & Hearn, 2010), charter school legislation (Renzulli & Roscigno, 2005; Wong & Langevin, 2005; Wong & Shen, 2002), school choice measures (Mintrom, 2000), and state unit-record systems (Hearn, McLendon, & Mokher, 2008). EHA provides researchers with several advantages over cross-sectional, logistic regression models. These models allow for the analysis of time-dependent variables as well as allowing for the inclusion of time varying covariates. Using time-series cross-sectional data, they take into account the length of time until the event occurs and provide an estimate of the risk of an event occurring at any given time period (Bennett, 1999; Box-Steffensmeier & Jones, 2004; DesJardins, 2003).

The sample for the analysis includes a total of 46 states. As is typical in many studies of diffusion, Alaska and Hawaii were omitted. Policy diffusion is usually hypothesized geographically, and these states are not proximate to other ones. What is more, the states tend to be outliers along many of the social, economic, and political dimensions of interest in this study. Following convention in studies of partisan legislative action, Nebraska was omitted because of the state's unicameral and nonpartisan legislative system. Finally, Virginia was removed because of its adoption of an early star-scientists policy in the 1960s, prior to the time scope of this analysis.

The data for adoption, the year in which each state enacted legislation for an ES policy, were collected from biannual reports released by the Biotechnology Industry Organization (BIO) in the years of 2004, 2006, and 2008. These reports were supplemented with information from SSTI's website (www.ssti.org) and from Coburn's (1995) comprehensive *Partnerships* volume. In all cases, the date of the policy was verified through official state organizations and legislative records, the latter gathered through accessing Lexis-Nexis and state governments' websites. In characterizing these policies, SSTI (2006) describes them as seeking to build a state's research base through the attraction of world class scholars who have a history of attracting federal research dollars, intending these scientists to patent and create successful start-up companies within a state. The dependent variable excludes policies that endow chairs in fields not associated with economic development as well as policies that target a single institution.[13]

The independent variables used in this analysis reflect the propositions discussed earlier in the paper: employment in private R&D (lagged), legislative professionalism, patents per 100,000 population (lagged and logged), GSP per capita (lagged and logged), a binary variable for unified Democratic control of government, the number of states in the census region with an ES program in place, a binary variable for whether the state had a coordinating board for higher education, governor's institutional powers, federal R&D expenditures per capita (lagged and logged), state R&D expenditures per capita (lagged and logged), the unemployment rate (lagged), and selected interaction terms for these indicators. The decision to lag many of the variables one year is based on the timing of state legislative sessions: Because these sessions are typically held at the beginning of a calendar year, policy makers would have access to only the prior year's data on a state's economic climate and research enterprise.[14] The importance of timing and sequence in event history modeling supports the decision to lag these select variables. The data for these variables were collected from a variety of reliable secondary data sources, such as the Bureau of Economic Analysis and the National Science Foundation (NSF). The variable for governor's institutional powers draws on data organized and made publicly available by Beyle (2004).[15] Because of our separate hypothesis on partisan control of government, we reconstructed Beyle's (2004) operationalization to exclude the component measuring partisan balance in the legislature. Table 1 provides a description of each of these variables with the source of the data.[16]

For our event of interest, we define ES policies as those that explicitly aim to foster economic development and the research enterprise. Time is measured discretely as the calendar year in which a state first adopted an ES policy. Our data set begins in 1983, when Ohio adopted an early ES policy, and continues until 2007, by which time a total of 20 states had adopted such policies.[17] States that had yet to adopt an ES policy by the end of the observation period are right-censored observations. EHA utilizes information about both censored and non-censored cases to predict the risk of event occurrence at a point in time. Because of the

TABLE 1
Variable Indicator Descriptions and Sources

Variable Indicator	Description	Source
State adoption of an ES policy	Dummy variable (yes = 1; no = 0) indicating whether a state adopted an eminent scholars policy in a given year	BIO Reports, legislative records
GSP per capita (lagged and logged)	Annual measure of the gross state product per capita (lagged and logged)	Bureau of Economic Analysis
Unemployment rate (lagged)	A state's annual unemployment rate (lagged)	Bureau of Labor Statistics
Employment in private R&D (lagged)	Percentage indicating the share of individuals in a state working in private research and development (lagged)	*Moody's Analytics*
Patents per 100,000 population (lagged and logged)	Number of utility patents awarded to a state annually per capita (lagged and logged)	U.S. Patent and Trademark Office
Federal R&D expenditures per capita (lagged and logged)	Federal R&D expenditures to universities per capita (lagged and logged)	NSF WebCASPAR
State R&D expenditures per capita (lagged and logged)	State R&D expenditures to universities per capita (lagged and logged)	NSF WebCASPAR
Unified Democratic control of state government	Dummy variable (yes = 1; no = 0) indicating whether the Democratic party controlled both chambers of the legislature and governorship in the state	Klarner et al. (2013)
Legislative professionalism	Measure of a state's legislative professionalism (higher scores mean greater capacity)	Squire (2007)
Governor's institutional powers	Index representing the combined tenure potential, budgetary powers, appointment powers, and veto powers of a governor	Beyle data at http://www.unc.edu/~beyle/gubnewpwr.html
Coordinating board	Dummy variable (yes = 1; no = 0) indicating whether the state has a coordinating board	McGuinness' *States Structures Handbook* and Education Commission of the States (1997)
# of states in a census region with an ES policy	Number of states in the state's census region with an eminent scholars policy	Authors' calculations using data from the dependent variable and maps
Interaction between GSP and time	Interaction between gross state product per capita (lagged and logged) and units of time (logged)	Derived: GSP per capita (lagged and logged) * units of time (logged)

potential for serial dependence within states, the Lin and Wei (1989) robust variance estimator was used, clustering on states.[18]

The dependent variable expresses the duration of time in years (t) until a state (i) adopts an ES policy. First, we calculated the survival function, representing the probability that a unit will "survive" (or not experience the event) longer than time t (cf. Box-Steffensmeier & Jones, 2004; DesJardins, 2003; Singer & Willett, 2003). Next, we calculated the hazard function, our primary dependent variable of interest. The hazard function represents the instantaneous rate of change in the probability of experiencing an event at time t, conditional upon "survival" up to the specified period of time. For our analysis, the hazard function indicates the probability that a state without an ES policy will adopt one in a particular year, given its values of the independent variables that influence change.

Because the probability that a state adopts an ES policy will likely change over time as such policies become more popular, the risk of experiencing the event must be allowed to vary in different time periods. Further, in the context of state policy adoption, specifying a distributional form for the baseline hazard rate is atheoretical. To address these concerns, we used a specific type of event history model known as the Cox proportional hazards model. The Cox approach focuses on the relationship between the outcome and the covariates of theoretical interest, without the need for specifying the functional form of duration dependence (Box-Steffensmeier & Jones, 2004). For each year of the analysis, any state that has not yet adopted an ES policy is included in the "risk set" of observations that are eligible to have an event at that point in time. Information about the order of the events is used to estimate the conditional probability that a state will adopt an ES policy for each time period, given the number of states at risk and the values of those states' covariates. Maximum partial likelihood estimation is used to calculate the parameters using information about these ordered failure times to predict the likelihood of observing the data that we have, in fact, observed. These estimates characterize how the hazard distribution changes as a function of the covariates without making any assumptions about the underlying nature or shape of the baseline hazard rate.

"Tied" events occur when multiple states adopt an ES policy in the same year. Since maximum partial likelihood estimation uses information about the rank ordering of failure times, tied events make it difficult to determine which states should be included in the risk set because the exact order in which the events occurred is undetermined. In this analysis, the Efron method was used to construct the partial likelihood estimates when tied events occurred (Box-Steffensmeier & Jones, 2004).

The final model for the adoption of an ES system may be expressed as:

$$h_i(t) = h_0(t)\exp(\beta' x) \tag{1}$$

where $h_i(t)$ is the proportional hazard of adopting an ES policy for state i in year t and $\beta' x$ is the matrix of regression parameters and covariates (Box-Steffensmeier & Jones, 2004; Hosmer & Lemeshow, 1999).

The Cox model is a "proportional hazards" model, which means there is an assumption that the ratio of the hazard rates between any two observations or groups is constant over time. In order to test this assumption, Schoenfeld residuals were calculated to determine whether the effect of any of the covariates changed disproportionately over time (Grambsch & Therneau, 1994). Initial diagnostics suggested that GSP per capita violated the proportional hazards assumptions of the Cox model. Interacting a variable with time is the preferred approach for including time-varying covariates in the Cox model.[19] The inclusion of the interaction term of GSP with time satisfied this assumption while enabling the model to include this important explanatory variable. The interaction term was generated by multiplying GSP per capita (lagged and logged) with *ln(t)* in the formula above. Additional diagnostic methods were conducted including an assessment of the overall model fit using Cox-Snell residuals and an examination of the deviance residuals to identify any outlier values.

Table 2 presents the descriptive statistics for the independent and dependent variables in the analysis for the 46 states in the analysis in

TABLE 2
Descriptive Statistics for the Sample (Standard Deviations in Parentheses)

Variable	1983		2007	
State adoption of an ES policy	0.022	(0.147)	0.435	(0.501)
GSP per capita (lagged and logged)	10.245	(0.182)	10.661	(0.177)
Unemployment rate (lagged)	0.093	(0.023)	0.045	(0.009)
Employment in private R&D (lagged)	0.003	(0.005)	0.004	(0.004)
Patents per 100,000 population (lagged and logged)	2.337	(0.660)	3.055	(0.759)
Federal R&D expenditures per capita (lagged and logged)	3.526	(0.637)	4.502	(0.480)
State R&D expenditures per capita (lagged and logged)	1.691	(0.863)	2.240	(0.625)
Unified Democratic control of state government	0.478	(0.505)	0.326	(0.474)
Legislative professionalism	0.207	(0.106)	0.183	(0.120)
Governor's institutional powers	3.770	(0.680)	3.491	(0.453)
Coordinating board	0.587	(0.498)	0.522	(0.505)
# of states in census region with an ES policy	0.543	(0.504)	5.413	(3.512)

1983 and in 2007. Interestingly, states' patenting activity experienced a dramatic increase over the period of the study, reflecting the increased importance of patenting in the United States between 1983 and 2007. Similarly, both federal and state R&D expenditures to universities doubled in this time frame, showing the increased investment in university R&D from all levels of government.

Table 3 lists the states that adopted an ES program during each year of the analysis, the number of states in the risk set at each time period, the survivor function, and the hazard rate.[20] Over time, the survivor function declines, beginning a rapid descent in 1997 until the final year of analysis. Over the period of the study, no more than four states ad-

TABLE 3
States Adopting an Eminent Scholars Policy, with Kaplan-Meier Survivor Function and Hazard Rate

Year	States Adopting Eminent Scholars Policies	Number of Adoptions	Cumulative Adoptions	Risk Set	Survivor Function	Hazard Rate
1983	OH	1	1	46	0.978	0.001
1984	TN	1	2	45	0.957	0.001
1985		0	2	44	0.957	0.000
1986	NC	1	3	44	0.935	0.001
1987	LA	1	4	43	0.913	0.001
1988		0	4	42	0.913	0.000
1989		0	4	42	0.913	0.000
1990	GA	1	5	42	0.891	0.002
1991	AZ	1	6	41	0.870	0.002
1992		0	6	40	0.870	0.000
1993		0	6	40	0.870	0.000
1994		0	6	40	0.870	0.000
1995	MO	1	7	40	0.848	0.002
1996		0	7	39	0.848	0.000
1997	SC, KY	2	9	39	0.804	0.006
1998	WI	1	10	37	0.783	0.003
1999	NY	1	11	36	0.761	0.004
2000		0	11	35	0.761	0.000
2001		0	11	35	0.761	0.000
2002	AR	1	12	35	0.739	0.006
2003		0	12	34	0.739	0.000
2004	KS	1	13	34	0.717	0.009
2005	TX, WY	2	15	33	0.674	0.027
2006	CT, FL, PA, OK	4	19	31	0.587	0.094
2007	WA	1	20	27	0.565	0.074

opted an ES program in a single year. The final survivor function of .565 indicates that 57% of states of our sample of 46 states had not adopted an ES program by the end of 2007.

The hazard rate provides an estimate of the likelihood that a state without an ES program would adopt one in a particular year. In all years, the hazard rate is less than 10%, indicating that there was no sudden time period in which there was a rapid change in the likelihood of adopting an ES program. As illustrated in Figure 1, however, the hazard rate began increasing dramatically in the late 1990s. This may suggest that, as the number of non-adopting states decreased, this policy option came to be viewed as an increasingly viable vehicle for leveraging university resources.[21]

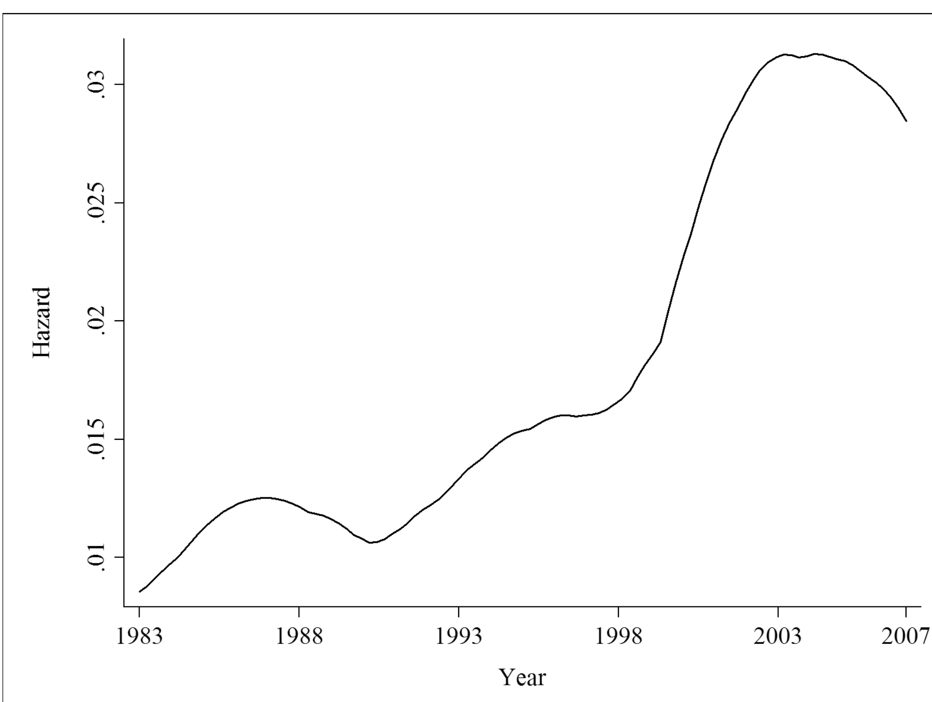

Figure 1. Smoothed Hazard Estimates for ES Policies (Smoothed 3 Years)

Findings

Table 4 presents the results of the event history analysis for adoption of an ES program. Partisan politics, operationalized as Democratic control of the legislative and executive branches of state government, appear to have had no influence on a state's adoption of an ES program, *ceteris paribus*. On the other hand, several other hypothesized influences did emerge.

The results suggest that a state's employment in private R&D activity had a negative effect on the hazard of adoption of an ES program.

TABLE 4

Results from Cox Proportional Hazards Model for State Adoption of an Eminent Scholars Policy (Standard Errors in Parentheses)

Variable	Coefficient
GSP per capita (lagged and logged)	–7.289 (5.078)
Unemployment rate (lagged)	–157.123* (20.151)
Employment in private R&D (lagged)	–984.779** (360.452)
Patents per 100,000 population (lagged and logged)	–1.338* (0.591)
Federal R&D expenditures per capita (lagged and logged)	1.102[a] (0.577)
State R&D expenditures per capita (lagged and logged)	0.120 (0.356)
Unified Democratic control of state government	1.022 (0.603)
Legislative professionalism	8.020** (2.900)
Governor's institutional powers	–3.216* (1.455)
Coordinating board	1.277* (0.586)
# of states in census region with an ES policy	0.049 (0.106)
Interaction between governor's institutional powers and unemployment rate	50.597* (20.151)
Interaction between GSP per capita and logged time	4.761* (2.268)
Log Pseudo-Likelihood	–54.568

Note. $n = 964$.
[a] $p < .057$.
$*p \leq .05$. $**p \leq .01$.

Similarly, a state's patenting activity, as measured by patents per capita, appears to have decreased the probabilities of states adopting an ES policy. The effects for these two "private R&D" characteristics support the belief that states that have a strong existing commercial R&D base are at less risk to adopt an ES policy. Figure 2 illustrates the relative influence of these private R&D variables, comparing the hazard rate for an average state to states with hypothetical values for these characteristics. States at a competitive disadvantage in existing private R&D activity may look to attract eminent university scientists as a way to redress their perceived disadvantage.

While not quite significant at the conventional $p \leq .05$ level, states with relatively high per capita rates of federal R&D funding were at a

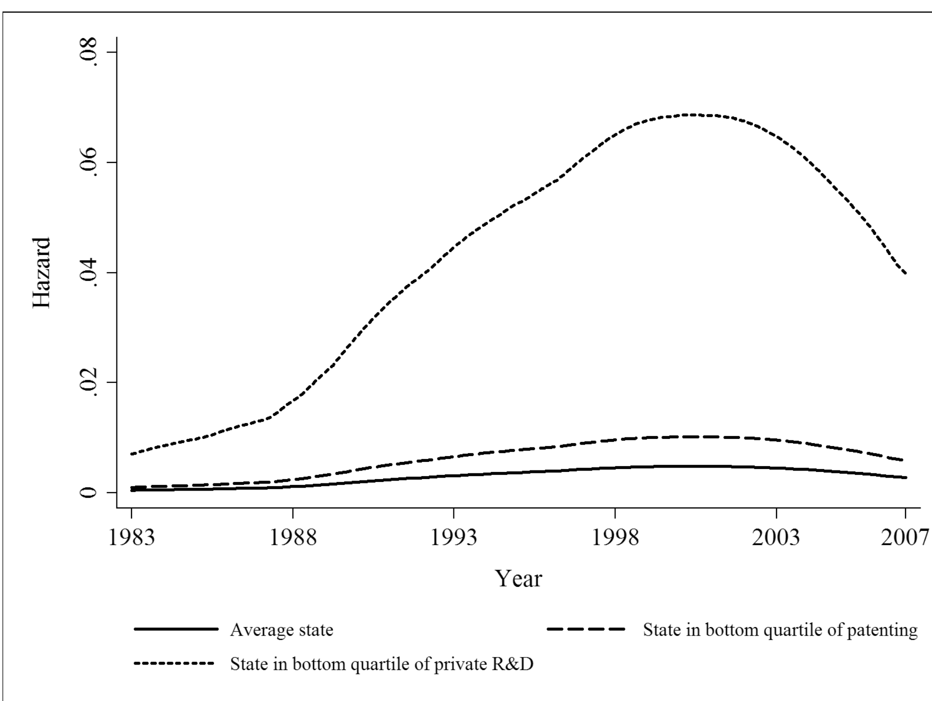

FIGURE 2. State Adoption of an ES Policy:
Smoothed Hazard Function by Private "R&D" Characteristics

greater hazard of adopting ES programs (see Figure 3).[22] Thus, the combination of lower private R&D activity and notably strong federal R&D activity (largely in research universities) helped prompt states toward adoption. Under the economic development logic presumed to propel many state ES initiatives, this finding may reflect a "failure to communicate." That is, one can speculate that the policies are aimed toward ending a disconnect between admirable levels of university R&D activity and lagging performance on state economic-development goals. Legislators may ask why their reputedly strong universities are not more directly contributing to addressing economic concerns in the state and may see eminent scholars programs as a route to improving those linkages.

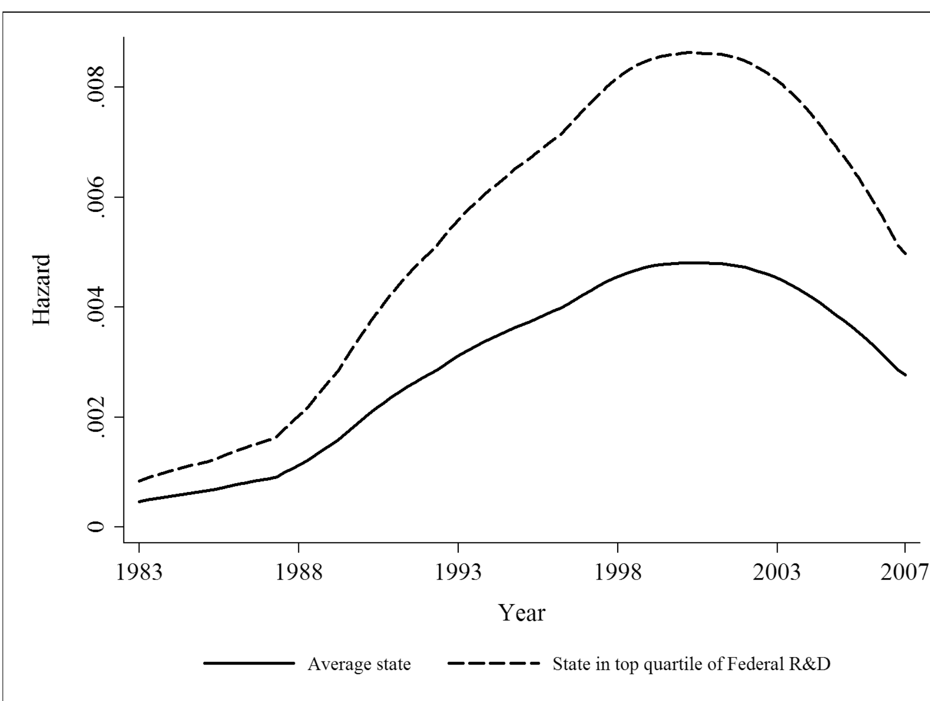

FIGURE 3. State Adoption of an ES Policy:
Smoothed Hazard Function by Federal R&D Expenditures

The findings also indicate that over time a state's legislative professionalism has had a positive influence on adoption, as we had hypothesized. As the informational and analytic resources available to a state's legislators increase, so does the probability that the state will adopt an ES policy. Figure 4 illustrates this effect, which may suggest that attracting legislative support for ES policy designs may depend on robust levels of supporting personnel and resources for lawmakers.

Most states take one of two approaches to the governance of public higher education: a powerful consolidated statewide governing board or a less centralized, more facilitative coordinating board. The results of the present analysis indicate that the existence of a higher-education coordinating board in a state appreciably raised the probability of ES adoption. Figure 5 illustrates this striking impact. Coordinating boards may be better placed to serve as mediators between a state's universities and legislators attempting to leverage those institutions toward state economic-development goals. In such a context, universities and states

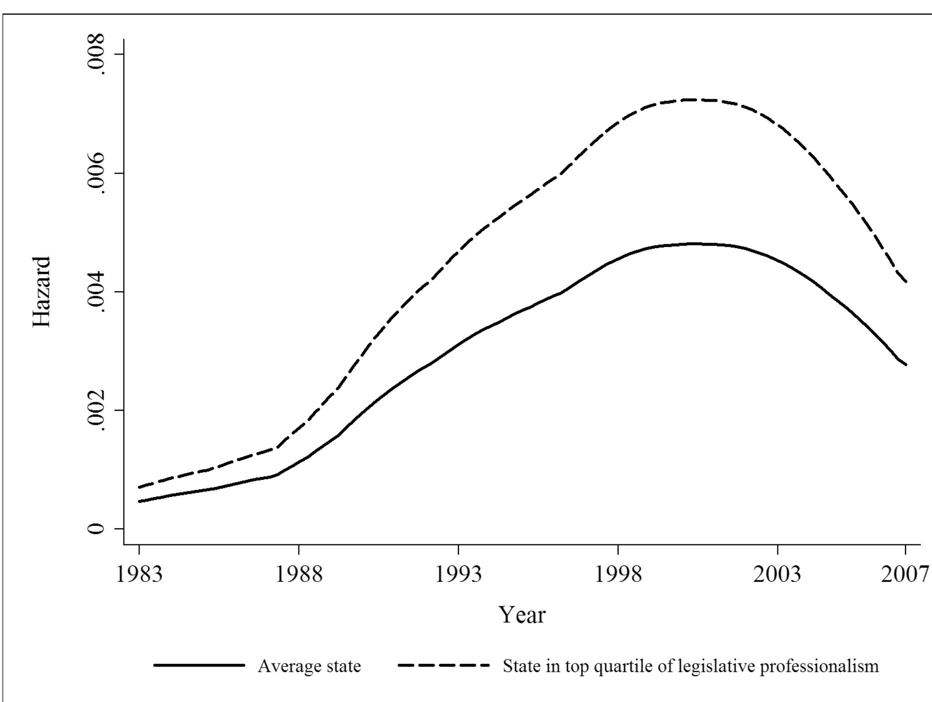

FIGURE 4. State Adoption of an ES Policy:
Smoothed Hazard Function by Legislative Professionalism

may be more able to negotiate goals and organizational arrangements for the infusion of the talent that ES programs can provide. That is, coordinating boards may be better positioned than consolidated governing boards or planning agencies to play dual roles advocating for the needs of both their states as a whole and their states' specific institutional sectors.

Contrary to what earlier analyses of state-policy adoptions might suggest, the results revealed no evidence of inter-state diffusion. That is, there was no observed relationship between the number of nearby states adopting ES programs and the risk a state would adopt that approach itself. Because, as noted earlier, there are varied approaches to assaying the influences of other states on a given state's policy actions, we explored alternative specifications of diffusion for the analysis. For example, in addition to testing for the census-region indicator described in Table 1 and presented in Table 4, we tested for effects of a census-division indicator and a contiguous-states indicator.[23] Neither of these

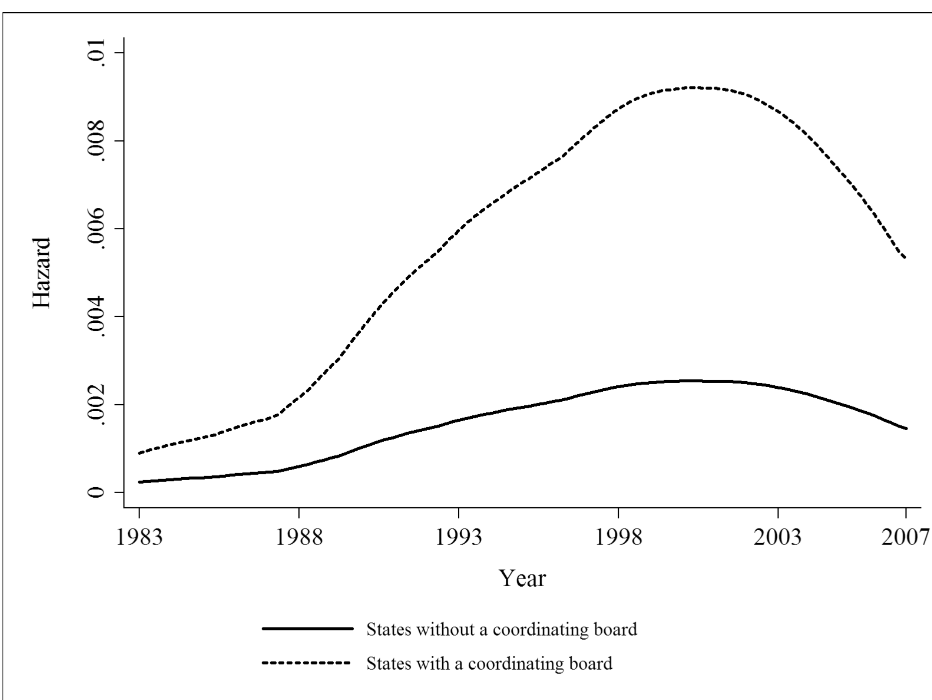

FIGURE 5. State Adoption of an ES Policy:
Smoothed Hazard Function by Higher-Education Governance Characteristics

alternative specifications proved significant in otherwise identical modeling, and neither affected the pattern of other results, so results for the census-region indicator are presented here. These results suggest that if states do consider nearby states in deciding on ES policies, those influences are not encompassed in the specifications tested here.

Interestingly, the analysis did reveal evidence of two noteworthy interaction effects. The interaction of GSP and time, discussed earlier as a necessary addition to the model for statistical reasons, showed positive and significant effects for years after 1993. Table 5 and Figure 6 illustrate the results for GSP over time.[24] The graphic illustrates that for years prior to 1993, the 95 percent confidence intervals contain zero.

TABLE 5
Interaction Between GSP and Logged Time

Year	Effect on Hazard Rate
1983	–7.289
1984	–3.988
1985	–2.058
1986	–0.688
1987	0.374
1988	1.242
1989	1.976
1990	2.612
1991	3.173
1992	3.675
1993	4.128*
1994	4.543*
1995	4.924*
1996	5.277*
1997	5.605*
1998	5.912*
1999	6.201*
2000	6.473*
2001	6.731*
2002	6.975*
2003	7.207*
2004	7.429*
2005	7.640*
2006	7.843*
2007	8.037*

* $p \leq .05$.

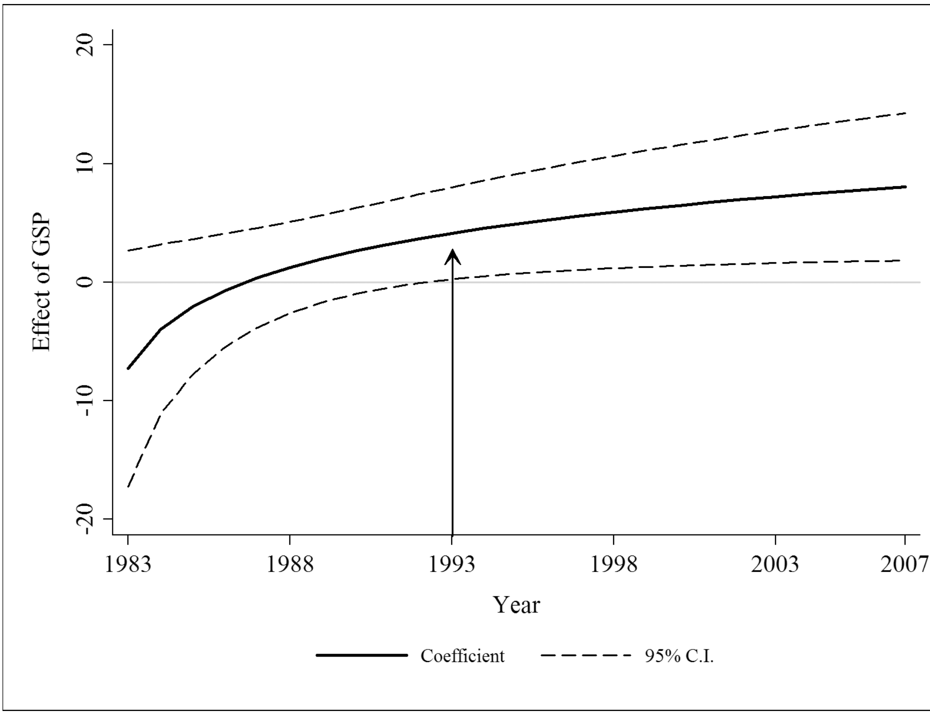

FIGURE 6. Interaction Between GSP and Logged Time

Thus, until 1993, there is no evidence for the effect of state wealth and adoption. After that year, however, the relationship between GSP and time had a positive effect on the hazard of adoption. It appears that, as the policy became more widespread nationally, wealthier states began to view the option as an opportunity to buttress and leverage their economic prosperity.

The results for the statewide unemployment rate and the institutional power of governor were intriguing. A product-interaction term for unemployment and Beyle's five-point governor's institutional powers scale (an indicator reflecting the product of multiplying the raw values of the two indicators by each other) captured a dynamic relationship between a governor's powers and unemployment. Figure 7 shows the effects of unemployment along the different positions on the governor's power scale.[25]

When the governor's level of power is just beyond the median (3.6), the hazard of adoption becomes significant. The findings suggest that

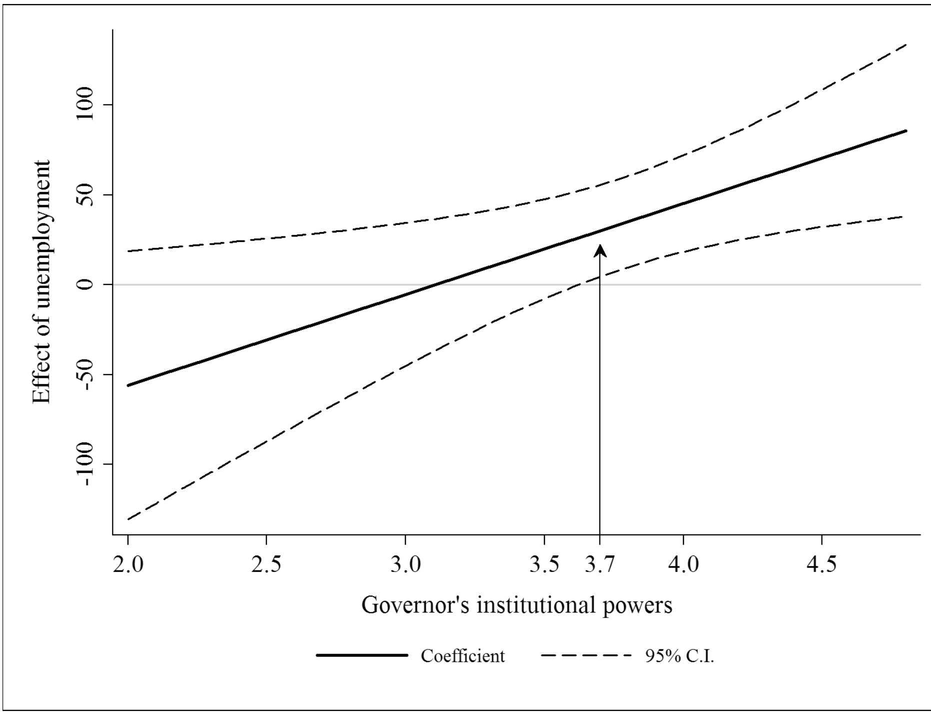

Figure 7. Returns to Unemployment at Different Levels of Governor's Institutional Powers

the strength of a governor's powers relates notably to the probability of ES adoption when economic difficulties loom: When unemployment was high, states with strong governors were more likely to adopt such a policy.

Implications

The existence of esteemed academic institutions is neither a sufficient nor necessary condition for science and technology-based economic development in a state or region (Feldman & Francis, 2004). As Orsenigo has observed, "The biotech industry in Italy developed in Milan, which did not have the top-rated academic research while Naples, an important academic center, did not develop a biotech industry" (2001, p. 83). Similarly, there are no guarantees that scientific and technological innovations on campuses will foster local economic development (Feldman & Desrochers, 2003). Yet, universities appear to have been integral to numerous economic development successes, and Geiger and Sá (2005, 2008) and others have concluded that governmental investment to promote scientific and technological innovations can make good sense.

In a series of case studies, Feldman and Kelley (2002) found that state efforts to establish university technology-transfer programs, support applied research-grants programs, and provide emerging businesses with access to campus-based research resources and facilities were important elements in the successes of several small science and technology-based firms. As Douglass (2007) has argued, "In a sense, the states have launched a great experiment shaped by a remarkable faith in science and technology as the primary driver of future economic growth and by a worry that state governments' lack of investment or enlightened direction would mean a potentially devastating disadvantage in the national [and] global economy" (p. 104).

While the present analysis enhances understanding of the factors driving states in these directions, it leaves unexamined what happens in the "black boxes" of individual eminent scholars programs. For the purposes of this analysis, a variety of ES policy incarnations were necessarily collapsed, but states' efforts vary in their targeted institutions and fields and in their structural, financial, and governance arrangements. As Bercovitz, Feldman, Feller, and Burton (2001) have stressed, there are numerous approaches to supporting university involvement in technology transfer and science and technology-based economic development. What is more, large-scale, multiyear quantitative modeling such as that undertaken here does not reveal the reasoning of state officials in developing, funding, and implementing ES programs in particular years. Feller (1988, 1992a) has argued that state governments' portfolios of science and technology policies often reflect inconsistent or unclear reasoning and these decisions have been inadequately analyzed and evaluated (see also Youtie et al., 1999). In establishing new ES programs, what relationships are policy makers and policy entrepreneurs explicitly positing (or implicitly assuming) regarding the connections among academic research, technical innovation, and economic growth? How might those theories best be tested? And, in supporting and participating in such programs, what reasoning are university leaders and faculty members following? Such questions are better answered through intensive case-study analysis.

But the present analysis does contribute substantially to our understanding of the emergence of ES programs. It is clear that the model captures substantial influences on states' attraction to "star scientist" initiatives and that such initiatives are based in an intriguing vector of socioeconomic, political-structural, and postsecondary governance factors. Without question, state economic and demographic conditions do help prompt state investment in this particular form of economic-development activity. We do, indeed, see signs of policy making from disadvantage. Yet, the political and postsecondary governance contexts of states also play an important role in state adoption of ES programs. Notably, coordinating boards appear to be facilitative of adoptions in this arena, as do high levels of legislative professionalism. Might well informed, collaborative policy and interest arenas be conducive to adopting university-focused development policies?[26]

Further, we find it particularly noteworthy that states with governors of an "average" institutional power rating are more likely to adopt these innovative programs until the unemployment rate is above 8.9 percent. This result raises the intriguing possibility that, when not faced with significant economic difficulties, governors outside of states with powerful and visible executive branches may advocate for state scholar-recruitment programs as a way to elevate their visibility among stakeholders and voters as policy entrepreneurs and leaders.

Notable, too, is the absence of a relationship between partisan control of state government and adoption by states of ES programs (the indicator of a partisan effect here would be significant only at the $p \leq .10$ level). It would be an overstatement to suggest that our state-level investigation reinforces the observations of Douglass (2007) and others that a bipartisan consensus has emerged nationally in support of government-sponsored science and technology initiatives. At the same time, though, the absence of firm evidence of partisanship does keep the bipartisanship hypothesis alive at the state level.

Concerning the effects of state economic conditions on the emergence of ES programs, the findings provide mixed support for the hypotheses proposed earlier. The bulk of the results provide support for the "policy making from disadvantage" proposition— that is, the idea that relative economic privation in a state prompts policy action. For example, states with lower private R&D and patenting activity were more likely to initiate ES programs. Yet, there is complexity in these findings. In the early years of our study period, state wealth was found to have no effect on adoption, but from 1993 on, that relationship had an increasingly large and positive effect. It is therefore striking that it was in the early 1990s that Georgia's program was adopted and began to achieve national visibility and praise. Perhaps, then, as state ES policies become known and perceived as successful, their originating logic moves from ameliorating economic conditions to enhancing existing state strengths.[27] On the whole, however, the findings suggest that, at least in this realm of economic development, less wealthy states may serve as the truest "laboratories for innovation."

In highlighting such relationships, the present analysis may suggest some standards on which the programs might be further studied and even evaluated. That is, because much of the present evidence supports the "policy making from disadvantage" proposition, and because that perspective is frequently voiced in legislatures as a rationale for the programs, ES programs would seem to merit scrutiny regarding their contributions to state economic development. While it seems obvious that federal and private R&D funding for universities will be expected to grow in the wake of ES program adoption and successful scholar recruitment, the more difficult questions involve such funding's contributions at the margins to state economic conditions. In assaying the effectiveness of the programs, however, it is important to consider benefits and costs in encompassing ways. Institutional reputations may be improved in short order by highly visible state-funded faculty hires, which may in turn benefit the recruiting of other faculty, post-docs, and graduate students. Welcome facilities upgrades may accompany the new hires as well. Conversely, the establishment of a new stratum of elite faculty, and any accompanying infrastructure investments, may disrupt established social, economic, and political relations on campus. Clearly, eminent scholars programs reflect "neo-liberal" policy making trends, with all that those trends may imply for universities (Slaughter & Rhoades, 2004). Indeed, the infusion of these newly recruited, externally funded scholars on campus may be viewed by some as representing "academic capitalism" incarnate. Do the short- and long-term marketplace rewards of recruiting "star" scholars come at some expense to traditional academic priorities, norms, and values? Whatever the answer, there can be little question that incorporating state-funded star scientists and their ambitious, resource-intensive research programs into universities has important internal organizational impacts. That topic merits in-depth longitudinal study.

Investigating the measurable effects of ES programs is beyond the reach of the present analysis, however. It may be best to conclude instead with some thoughts on broader implications of our findings regarding the programs' genesis. ES programs are only one of the many "new economy" initiatives states are adopting to boost their standings relative to other states and internationally. Because these programs are so directly focused on knowledge creation and development, however, and because they represent one of the most prominent forms of technology-based economic development policies, ES programs may have greater potential to affect universities than other potential state initiatives in this arena. As such, the programs' chosen contours may reflect policy maker views concerning not only economic development but also postsecondary institutions. Somewhat different policy logics may drive the establishment of alternative programs that have less immediate effects on universities' core academic missions, strategic directions, operations, and hiring. Thus, assaying the extent to which the factors driving the adoption of ES policies are similar to those driving the adoption of *other* state science and technology policies poses an intriguing next step for research in this arena.

Notes

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[1] State adoption data are from reports of the Biotechnology Industry Organization (2004, 2006, 2008) and state legislative records.

[2] Eminent scholars programs may be characterized as both "upstream" and "downstream" in nature, to use the metaphor familiar in this arena (e.g., see Feller, 1992b). That is, they seed the ground for future innovation and development but can also provide immediate returns through new hiring and new collaborations with local industries in targeted areas.

[3] The Georgia program was formally adopted in 1990, and the first scholars were appointed in 1992. While economic challenges of the recent "Great Recession" reduced state support for the program, it endured and rebounded subsequently (Saporta, 2012).

[4] The institutions involved are the Georgia Institute of Technology, University of Georgia, Emory University, the Medical College of Georgia, Georgia State University, and Clark-Atlanta University.

[5] In 2007, SSTI selected the GRA's Eminent Scholars Program as the winner of the inaugural "Excellence in TBED Award" in the "expanding the research infrastructure" category. The award noted that the Georgia program has "demonstrated exceptional achievement in addressing the elements that have been found in successful technology-based economies" (see http://www.sstiawards.org/2007.html). In 2011, SSTI gave the same award to Kentucky for its similar "Bucks for Brains" program (see http://www.sstiawards.org/2011.html).

[6] There is evidence that star scientists produce measurable "spillovers" in the productivity of their scholarly colleagues, both on their home campuses and beyond in the "invisible colleges" of research collaboration (Azoulay, Graff Zivin, & Wang, 2009).

[7] For related findings supporting similar conclusions, see Zucker, Darby, and Armstrong (2002), Zucker, Darby, and Brewer (2003), and Di Gregorio and Shane (2003).

[8] See, for example, the conflicted literature on the merits of state-funded research parks.

[9] Consistent with the long tradition of scholarship on state policy innovation and diffusion (e.g., Berry & Berry, 1990, 1992; McLendon, 2003; Walker, 1969), we understand neighboring states as ones either sharing a contiguous border or sharing distinct regional ties, some of which may not necessarily share a land border. As we discuss later in the article, our approach is the latter: a regional-neighbor model.

[10] As an example from a midsized state, Kentucky's state legislature has appropriated more than $350 million to its eminent scholars program since the program's inception in 1997.

[11] Highly professionalized states include California, New York, Wisconsin, Massachusetts, and Michigan. Citizen legislatures include those in New Hampshire, Indiana, Maine, and Georgia.

[12] Interestingly, a review of the two studies reveals something of a similarity: Hart seems surprised by the lack of private entrepreneurs advocating for entrepreneurially focused policies, while Douglass seems surprised by the lack of university officials advocating for university-focused policies. While neither Hart nor Douglass focuses directly on ES programs, their work is similar in suggesting that the dynamics of program decisions in this arena are far from well understood.

[13] It is noteworthy that in the early 1980s, the University of Texas secured state funding for 32 endowed chairs in engineering and the natural sciences. While this was a pioneering effort, its specificity to only one institution removes it from our sample of adopted policies. In 2005, Texas adopted a broader, truly state-level policy.

[14] The majority of states conclude their legislative work by mid-May, and only eight legislatures meet year-round (National Council of State Legislatures, http://www.ncsl.org/programs/legismgt/about/sess2009.htm).

[15] See http://www.unc.edu/~beyle/gubnewpwr.html.

[16] Intercorrelations for the independent variables in the analysis are within ranges acceptable for ruling out multicollinearity as a significant threat to inference. The table excludes information for the product-interaction term of GSP and time, an indicator required by diagnostics for the subsequent EHA analysis. See subsequent text for more information.

[17] Given Virginia's early adoption, noted earlier, data for that state were included in this analysis only for specifying diffusion contexts for other states.

[18] We pursued this consistent with the recommendations of Box-Steffensmeier and Jones (2004).

[19] This interaction allows the covariate's effect to vary with the duration of not experiencing the event (Box-Steffensmeier & Zorn, 2001).

[20] The state of Texas is recorded in the dataset as adopting a statewide eminent scholars program in 2005. The program of the 1980s, mentioned earlier in the paper, is not considered a statewide policy effort because it focused only on the University of Texas, Austin. Other research institutions in the state were affected only by the later legislation.

[21] This is a speculative observation, as no evidence is available on the point.

[22] The corresponding p value for this coefficient is .057.

[23] The Census Bureau delineates two sets of subnational areas among states. Nested within four large census regions are nine census divisions. For example, the thirteen states in the West region are divided into the Mountain division (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming) and the Pacific division (Alaska, California, Hawaii, Oregon, and Washington). Thus, states can be divided into either four or nine groups based on Census Bureau definitions.

[24] The interaction is between GSP and the GSP*$ln(t)$, where $t = 1, 2, 3 \ldots$.

[25] While this represents the returns to unemployment for the entire time period, the authors recognize that there are also changes in unemployment rate from year to year.

[26] Recent conversations with state policy authorities, as well as some prominent recent governance changes in states, suggest to us that the ongoing resilience and endurance of many coordinating boards is not ensured. If such a trend is indeed emerging, then one of the facilitating conditions for the development (and perhaps maintenance) of ES programs may be eroding.

[27] Thus, a "Matthew effect" may progressively begin to operate, with more successful states acting to increase their advantages.

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